

Claims

1. A method for protecting a tuyere assembly (12) and a refractory lining of a furnace against damage caused by expansion of the refractory lining comprising the step of:
providing a clearance (40) between said tuyere assembly (12) and a
5 refractory lining portion (16) below said tuyere assembly (12)
characterized by
monitoring said clearance (40) by means of a displacement sensor (50).
2. The method as claimed in claim 1 further comprising:
providing at least one removable refractory layer (72,74; 72') below said
10 tuyere assembly (12); and
removing said at least one removable refractory layer (72,74; 72') if the
height of said clearance (40) is less than a predetermined value.
3. The method as claimed in claim 1 or 2 further comprising:
sealing said clearance (40) with a compressible sealing material (80).
- 15 4. The method as claimed in any one of the preceding claims, further
comprising:
continuously monitoring said clearance (40) during operation of said
furnace.
- 20 5. The method as claimed in any one of the preceding claims, further
comprising:
monitoring said clearance (40) during shutdown of said furnace thereby
determining contraction behaviour of said refractory lining portion (16)
below said tuyere assembly (12).
- 25 6. The method as claimed in any one of the preceding claims, further
comprising:
monitoring said clearance (40) during start-up of said furnace thereby
determining expansion behaviour of said refractory lining portion (16) below
said tuyere assembly (12).

7. The method as claimed in any one of the preceding claims, further comprising:
providing a temperature sensor (90) and monitoring temperature within said clearance (40) between said tuyere assembly (12) and said refractory lining portion (16) to detect possible hot gas leakage.
8. The method as claimed in any one of the preceding claims, wherein said displacement sensor (50) is a linear electromechanical displacement sensor.
9. The method as claimed in claim 8, wherein
said displacement sensor (50) includes a sensor body (52) mounted in a mounting hole (54) of a tuyere cooler (22) and a measuring pin (58) slidingly supported by said sensor body (52), said pin (58) having a tip (62) that is in contact with an upper surface (38) of said refractory lining portion (16) or said removable refractory layer (72,74; 72').
10. The method as claimed in claim 9, wherein
said tip (62) of said pin (58) consists of ceramic, cermet or refractory steel material.
11. The method according to claim 1, wherein said furnace is a shaft furnace, in particular a blast furnace.